MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2022/2023 (TERM ID 2210)

EME1016 – APPLIED STATICS

(ME)

15 FEBRUARY 2023
2.30 p.m. - 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This exam paper consists of only five printed pages, including this cover page.
2. Answer all questions .
3. Write all your answers in the answer booklet provided .

Question 1

a). If the force of the smooth roller at *B* (see Fig. 1a) on the bar bender is required to be 7.5 kN, determine the horizontal and vertical components of reaction at pin *A* and the required magnitude of force *F* applied to the handle. [10 marks]

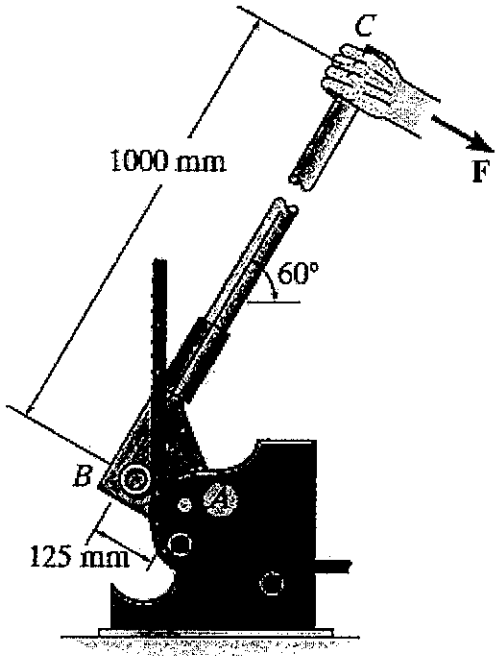

Figure 1a

b). Determine the support reactions of roller *A* (see Fig. 1b) and the smooth collar *B* on the rod. The collar is fixed to the rod *AB*, but is allowed to slide along rod *CD*. [10 marks]

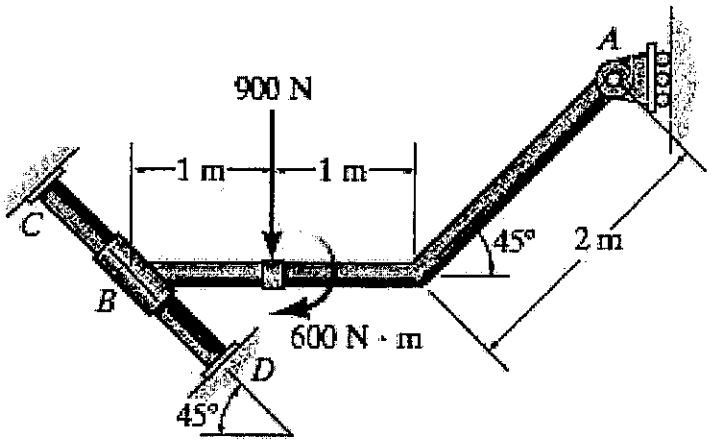

Figure 1b

c). You are trying to loosen a stubborn bolt. As a person who works with your hands, it is almost intuitive to make your efforts more effective by using pliers with longer handles or a longer wrench, or by putting a pipe over the wrench handle. Why does this help? [5 marks]

Continued . . .

Question 2

a). Determine the force in members *BG*, *BC*, and *HG* of the truss (see Fig. 2a) and state if the members are in tension or compression. [15 marks]

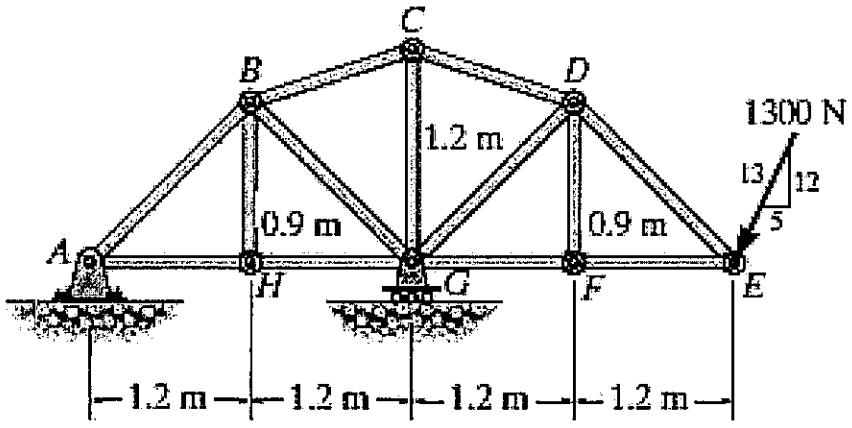

Figure 2a

b). Why are triangles, as opposed to other polygons, often used to build bridges and buildings? [10 marks]

Continued . . .

Question 3

a). A beam is under distributed load of 3 kN/m from -2 m $\leq x \leq$ 2 m, and 5 kN/m from 2 m $\leq x \leq$ 4 m. A 3kN force acted at x = 4m, and a 2 kN.m clockwise moment and 6 kN.m anti-clockwise moment are observed at x = -2 m and x = 2 m separately. See Fig. 3a. Determine the forces at point A and B, and thus draw the complete shear and moment diagrams for the beam. [12 marks]

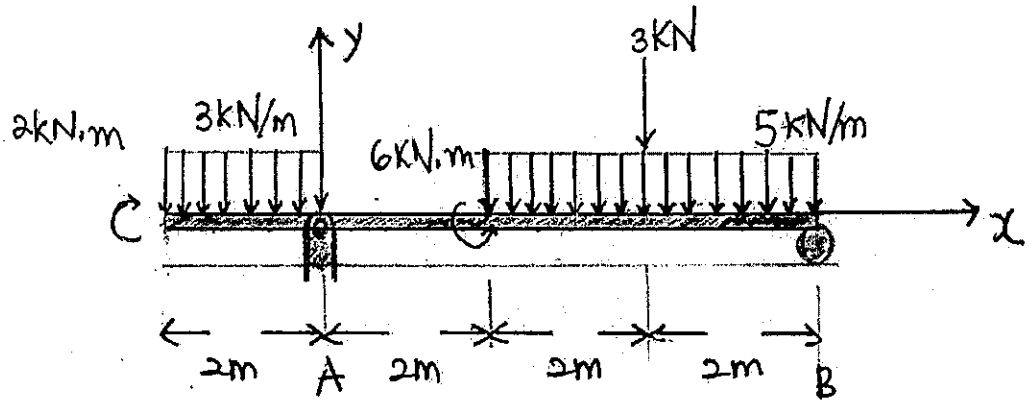

Figure 3a

b). Locate the centroid of the shaded area in the Fig. 3b. [13 marks]

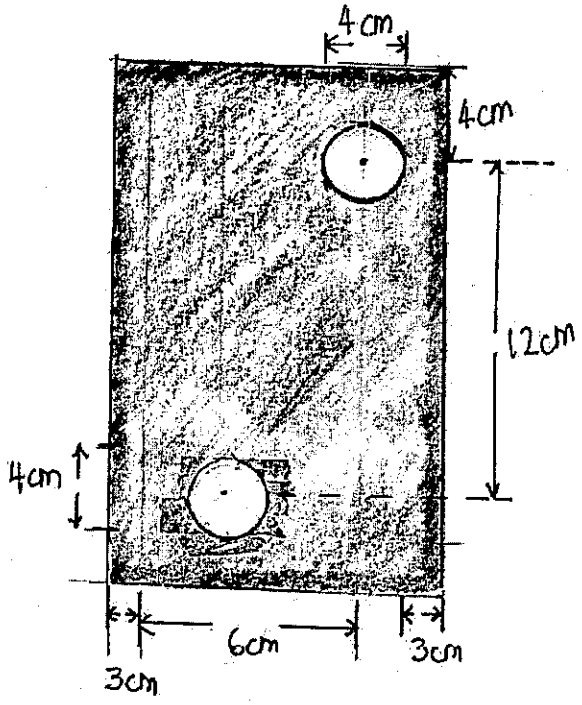

Figure 3b

Continued . . .

Question 4

a). Determine the moment of inertia of the shaded area in Fig. 4a with respect to the x-axis. [12 marks]

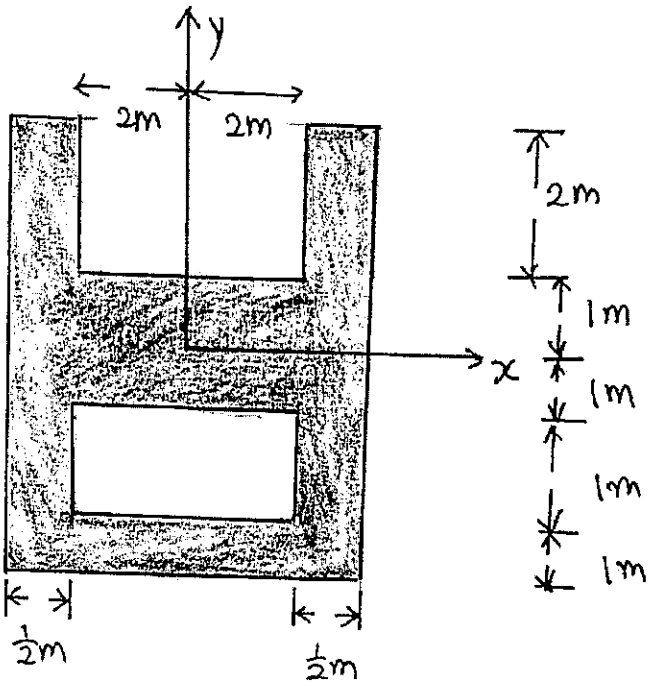

Figure 4a

b). A uniform bar AB of mass m and length l is leaning against the vertical wall as shown in Fig. 4b. The coefficient of static friction between the supporting surfaces and the ends of the pole is $\mu_s = 0.3$. Determine the force P which causes impending slip if P acts to the right. [13 marks]

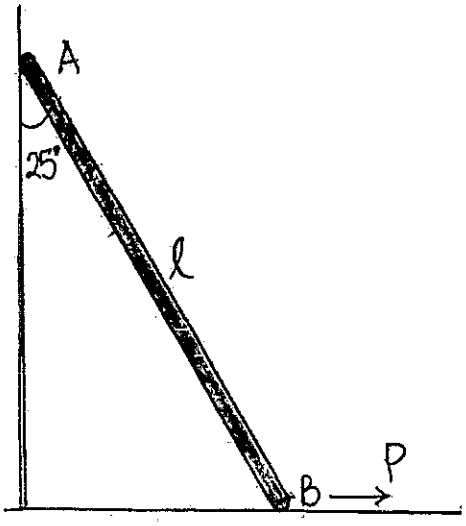

Figure 4b

End of Paper